

WHAT IS CLAIMED IS:

1. A printhead for a color printer comprising:
 - a first color printbar comprised of a plurality of first color die modules spaced substantially evenly apart and having a gap between each of the plurality of first color die modules;
 - a second color printbar for printing a second color different from the first color and comprised of a plurality of second color die modules spaced substantially evenly apart and having a gap between each of the plurality of second color die modules;
 - a third printbar comprised of a plurality of multicolor die modules, each of the plurality of multicolor die modules comprising a single die module segment of the first color and a single die module segment of the second color; and
 - a print region covered by the combination of the plurality of first color die modules, the plurality of second color die modules and the plurality of multicolor die modules, wherein each of the plurality of multicolor die modules substantially covers the print region exposed by the gaps between each of the plurality of first color die modules and between each of the plurality of second color die modules.
2. The printhead of claim 1 further comprising:
 - a fourth color printbar comprised of a plurality of third color die modules spaced substantially evenly apart and having a gap between each of the plurality of third color die modules; and
 - a fifth color printbar comprising a plurality of fourth color die modules spaced substantially evenly apart and having a gap between each of the plurality of fourth color die modules,
 - wherein each of the plurality of multicolor die modules of the third printbar further comprise a single die module segment of the third color and a single die module segment of the fourth color;
 - wherein the print region is covered by the combination of the plurality of first color die modules, the plurality of second color die modules, the plurality of third color die modules, the plurality of fourth color die modules and the plurality of multicolor die modules, wherein each of the plurality of multicolor die modules substantially covers the print region exposed by the gaps between each of the

plurality of first color die modules, the plurality of second color die modules, the plurality of fourth color die modules and the plurality of fifth color die modules.

3. The printhead of claim 1 wherein the color printbars are in substantially vertical alignment, the second color printbar located between the first color printbar and the third color printbar.

4. The printhead of claim 1 wherein the color printbars are in substantially vertical alignment and the third color printbar, comprised of the plurality of multicolor die modules, is located between the first color printbar and the second color printbar.

5. The printhead of claim 1 further comprising:
a fourth color printbar and a fifth color printbar each having a plurality of third color die modules spaced substantially evenly apart and having a gap between each of the plurality of third color die modules, wherein the plurality of third color die modules are staggered such that the plurality of third color die modules of the fourth color printbar substantially cover the print region exposed by the gaps on the fifth color printbar and the plurality of third color die modules of the fifth color printbar substantially cover the print region exposed by the gaps on the fourth color printbar.

6. The printhead of claim 5 wherein the color printbars are substantially in vertical alignment, the first color printbar and the second color printbar located between after the fourth color printbar and the fifth color printbar and before the third color printbar.

7. The printhead of claim 1 wherein each of the plurality of first color die modules of the first color printbar are mounted on a top side of a substrate and each of the plurality of second color die modules of the second printbar are mounted on an opposite side of the substrate.

8. The printhead of claim 1 wherein the plurality of first color die modules of the first color printbar are mounted on a top surface of a first substrate, the plurality of second color die modules of the second printbar are mounted on a top surface of a second substrate and the plurality of multicolor die modules of the third printbar are mounted on a top surface of a third substrate.

9. A method for reducing the number of nonbuttable full-width array printbars in a printer, the method comprising the steps of:

providing a first color printbar having a plurality of first die modules each having a same first color, wherein each of the plurality of first die modules are spaced apart on the first color printbar;

providing a second color printbar having a plurality of second die modules each having a same second color, wherein each of the plurality of second die modules are spaced apart on the second color printbar;

providing a third color printbar having multicolor die modules each comprising the first color and the second color; and

locating the plurality of multicolor die modules of the third color printbar such that the plurality of multicolor die modules substantially cover a print region not covered by the spaced apart plurality of first die modules on the first color printbar and spaced apart plurality of die modules on the second color printbar.

10. The method of claim 9 wherein the color printbars are in substantially vertical alignment, the second color printbar located between the first color printbar and the third color printbar and further wherein ink in each of the plurality of first die modules, the plurality of second die modules and the plurality of multicolor die modules is printed from each of the first color printbar, second color printbar and third color printbar, in sequential order.

11. The method of claim 9 further comprising the steps of:

locating the third color printbar, comprised of the plurality of multicolor die modules, between the first color printbar and the second color printbar in substantially vertical alignment; and

printing color from the first color printbar, printing color from the third color printbar and then printing color from the second color printbar, in that order.

12. The method of claim 9 further comprising the steps of:

providing a fourth color printbar having a plurality of third die modules each having a same third color, wherein each of the plurality of third die modules are spaced apart on the fourth color printbar;

providing a fifth color printbar having a plurality of fourth die modules each having a same fourth color, wherein each of the plurality of fourth die modules are spaced apart on the fifth color printbar;

wherein the multicolor die modules of the third color printbar each comprise the first color, the second color, the third color and the fourth color, wherein each of the plurality of multicolor die modules on the third color printbar are located such that the plurality of multicolor die modules cover a print region not covered by the spaced apart plurality of first die modules on the first color printbar, spaced apart plurality of second die modules on the second color printbar, spaced apart plurality of third die modules on the fourth color printbar and the spaced apart plurality of fourth die modules on the fifth color printbar.

13. The method of claim 12 further comprising the steps of:

providing a sixth color printbar having a plurality of fifth color die modules each having a same fifth color, wherein each of the plurality of fifth die modules are spaced apart on the sixth color printbar;

providing a seventh color printbar having a plurality of sixth die modules each having a same sixth color, wherein each of the plurality of sixth die modules are spaced apart on the seventh color printbar;

wherein the multicolor die modules of the third color printbar each comprise the first color, the second color, the third color, the fourth color, the fifth color and the sixth color; and

wherein each of the plurality of multicolor die modules on the third color printbar are located such that the plurality of multicolor die modules cover a print region not covered by the spaced apart plurality of first die modules on the first color printbar, the spaced apart plurality of second die modules on the second color printbar, the spaced apart plurality of third die modules on the fourth color printbar, the spaced apart plurality of fourth die modules on the fifth color printbar, the spaced apart plurality of fifth die modules on the sixth color printbar and the spaced apart plurality of sixth die modules on the seventh color printbar.

14. A nonbuttable printhead comprising a set of printbars, each printbar comprised of a row of a plurality of nonbuttable die modules in substantial alignment, the set of printbars including a total number of printbars (Y) satisfying the relationship

$$X < Y < 2X$$

wherein X represents a total number of different colors capable of being applied by the printhead.

15. The printhead of claim 14 wherein the total number of printbars is five for a printhead that applies four different colors, the set of printbars comprising one primary printbar for each of the four different colors and one secondary printbar comprising die modules for each of the four different colors.

16. The printhead of claim 14 wherein the total number of printbars is six for a printhead that applies four different colors, one of which is black, the set of printbars comprising two printbars for black, one primary printbar for each of the three remaining different colors, and one secondary printbar comprising die modules for each of the three remaining different colors.

17. The printhead of claim 14 wherein the total number of printbars is six for a printhead that applies four different colors, the set of printbars comprising, in order, a first primary printbar for a first color, a first secondary printbar comprising die modules for the first color and a second color, a second primary printbar for the second color, a third primary printbar for a third color, a second secondary printbar comprising die modules for the third color and a fourth color, and a fourth primary printbar for the fourth color.

18. The nonbuttable printhead of claim 13 wherein the die modules of each of the printbars of the set of printbars are each mounted upon a surface of a substrate.

19. The nonbuttable printhead of claim 14 further comprising:
a second set a set of printbars wherein each printbar is comprised of a row of a plurality of nonbuttable die modules in substantial alignment, the second set of printbars including a total number of printbars (Y) satisfying the relationship

$$X < Y < 2X$$

wherein X is as defined above.

20. The nonbuttable printhead of claim 19 wherein the first set of printbars have a drop size and the second set of printbars have a drop size substantially different from the drop size of the first set of printbars.